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EXAMINER

CANTELMO, GREGG

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 05/30/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/867,383

Applicant(s)

KOUYAMA ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/7/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 1-13, 21 and 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-20 22 24-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received March 7, 2003:
 - a. The Examiner has considered applicant's comment regarding the species requirement presented in the previous office actions and upon further consideration as rejoined claims 22 and 24-26;
 - b. The objections to the drawings stand;
 - c. The specification objection is withdrawn in light of the amendment;
 - d. The 112 second paragraph rejection is withdrawn in light of the amendment;
 - e. The prior art rejections are withdrawn in light of the amendment.

Election/Restrictions

2. Applicant's election with traverse of the species election of Group I in Paper No. 8 is acknowledged. The traversal is on the ground(s) that the Examiner has not established why the two species are independent or distinct from each other. This is not found persuasive.

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over

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the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention. See MPEP § 809.02.

Applicant has not met this requirement with respect to the traversal of the species election. Claims 1 and 14 are held to be species which are not obvious variants of one another and therefore the species election stands. See MPEP § 806.

Furthermore, where inventions are related as disclosed but are distinct as claimed, restriction may be proper. Note that the limitations of claim 1, which includes an annular dielectric member and the apparatus does not require the gap configuration as set forth in claim 14 and therefore claim 1 is distinctly claimed from claim 14. Likewise claim 14, which requires the gap relationship, does not recite the dielectric annular member and therefore claim 14 is distinctly claimed from claim 1.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

3. Figures 10 and 11 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). See the page 1 and the Brief Description of the Drawings wherein these figures are disclosed as representations of conventional devices.

Response to Arguments

4. Applicant's arguments filed March 7, 2003 have been fully considered but they are not persuasive.

Applicant argues that the Applicant's have not admitted that the subject matter of Figs. 10 and 11 are not prior art. The Examiner is not readily persuaded. As set forth above and in the previous office actions, page 1 refers to Fig. 10 as a "conventional high frequency sputtering device" and Fig. 11 being a magnified view of the gap in the apparatus of Fig. 10. As well the brief description of the drawings identifies Figs. 10 and 11 as conventional.

Applicant's representative states that "applicants are not aware of a specific prior art teaching of this subject matter." If this is an accurate statement, how then could applicant identify these figures as conventional, such language leading one of ordinary skill in the art to interpret that such devices were known to applicant and known to one of ordinary skill in the art (thus conventional).

Considering that Applicant's response in the amendment filed March 7, 2003 does not agree with the original disclosure presented by Applicant, the Examiner maintains the objection to the drawings pending further clarification and/or labeling of Figs. 10 and 11 as prior art.

Claim Objections

5. Applicant is advised that should claims 18-20 be found allowable, claims 24-26, respectively, will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is

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proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claim 28 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 28 recites that the axially extending length and the radially extending length together is 3 mm or greater. In particular the Examiner questions the lower limit of the range of 3 mm. While the instant application never explicitly recites this relationship, it is understood that the gap length being 3mm or more and gap width being 3 mm or less teaches of a combined length of over 3 mm. However, it is not agreed that the instant application has support for a range including 3 mm as the lower limit. The instant application discloses that the gap has both a length and width. The minimum length being 3 mm. There is no support for a gap width of 0 mm and the instant application does not readily lead one of ordinary skill in the art to an arrangement wherein no gap exists. Thus using the lower limit of the length being 3 mm and the requirement of a gap width being present with the width being less than 3

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mm would only appear to support the length together being *greater than 3 mm*, exclusive of the lower limit 3 mm.

8. Claim 28 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. See item 7 above wherein there does not appear to be clear enabling disclosure for the axially extending length and radially extending length together being 3 mm.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 4,662,122 (Landau).

Landau discloses a high frequency sputtering device comprising: a processing chamber 40, high frequency power supply connected to the cathode 2, cathode 2 extending only along a given axial extent of the chamber, a target 28 mounted on a first side 6 of cathode 2, a metal plate 32 mounted in the processing chamber adjacent to the cathode by only in a location outside of the given axial extent of cathode 2 the metal plate 32 having a central opening and the outer edge of the plate is connected to the

grounded chamber 40, the metal plate 32 is arranged to form a gap having first and second portions between the metal plate and the target wherein the gap between the target and plate is sufficiently narrow to prevent plasma from passing through the gap (Figs. 1 and 2 as applied to claim 14).

A lower portion of the metal plate is in radial alignment with the target (Fig. 1 as applied to claim 15).

The metal plate 32 is located at a side of target 28 (Fig. 1 as applied to claim 16).

11. Claims 14 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 53 008377 A (JP '377).

JP '377 discloses a high frequency sputtering device comprising: a processing chamber 15, high frequency power supply connected to the cathode 5, cathode 5 extending only along a given axial extent of the chamber, a target 4 mounted on a first side of cathode 5, a metal plate 26 mounted in the processing chamber adjacent to the cathode by only in a location outside of the given axial extent of cathode 5 the metal plate having a central opening and the outer edge of the plate is connected to the grounded chamber, the metal plate is arranged to form a gap having first and second portions between the metal plate and the target wherein the gap between the target and plate is sufficiently narrow to prevent plasma from passing through the gap (Figs. 1, 6 and 7 as applied to claim 14).

The metal plate 26 is located at the front side and peripheral side of the target 4 (Figs. 6 and 7 as applied to claim 16).

Response to Arguments

12. Applicant's arguments with respect to claims 14-16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 18 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landau in view of the admitted prior art of the instant application or U.S. patent No. 4,401,546 (Nakamura).

The teachings of claim 14, with respect to Landau have been discussed above and are incorporated herein.

The difference between claims 18 and 24 and Landau is that Landau does not disclose the width of the gap to be 3mm or less.

The admitted prior art teaches that gap spacing of 2mm is known for the purposes of preventing plasma from entering the gap (page 1, paragraph [0003]).

Nakamura teaches the same concept (col. 3, ll. 36-47). This prevents sputtering of the cathode.

The motivation for providing gap spacing of 3mm or less is that it prevents plasma from entering the gap between the shield and target/cathode.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Landau by using a gap width of less than 3mm since it would have prevented plasma from entering the gap between the shield and target/cathode.

15. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landau in view of JP 57 194 254 (JP '254).

The teachings of claim 14, with respect to Landau, have been discussed above and are incorporated herein.

The difference between the instant claim and Landau is that Landau does not appear to teach of the shield and target being the same material (claim 17).

JP '254 discloses that is advantageous to use a shield member which is of the same material as the sputtering target (abstract).

The motivation for providing a shield and target of the same material is to prevent abnormal discharging (abstract). Furthermore one of ordinary skill in the art would have also recognized the use of a shield member of the same material as the target also reduces the risk of contamination of the film formed on the substrate if a portion of the shield material is sputtered.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Landau by providing a shield and target of the same material since it would have prevented abnormal discharging and reduced the risk of contaminating the film formed on the substrate.

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16. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '377 in view of JP 57 194 254 (JP '254).

The teachings of claim 14, with respect to JP '377 have been discussed above and are incorporated herein.

The difference between the instant claim and JP '377 is that JP '377 does not appear to teach of the shield and target being the same material (claim 17).

JP '254 discloses that is advantageous to use a shield member which is of the same material as the sputtering target (abstract).

The motivation for providing a shield and target of the same material is to prevent abnormal discharging (abstract). Furthermore one of ordinary skill in the art would have also recognized the use of a shield member of the same material as the target also reduces the risk of contamination of the film formed on the substrate if a portion of the shield material is sputtered.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '377 by providing a shield and target of the same material since it would have prevented abnormal discharging and reduced the risk of contaminating the film formed on the substrate.

17. Claims 18 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '377 in view of the admitted prior art of the instant application or Nakamura.

The teachings of claim 14, with respect to JP '377 have been discussed above and are incorporated herein.

The differences between claims and Landau are that Landau does not disclose the width of the gap to be 3mm or less (claims 18 and 24) or of the length of the gap being 3mm or more (claims 19, 20, 25 and 26).

With respect to claims 18 and 24:

The admitted prior art teaches that gap spacing of 2mm is known for the purposes of preventing plasma from entering the gap (page 1, paragraph [0003]).

Nakamura teaches the same concept (col. 3, ll. 36-47). This prevents sputtering of the cathode.

The motivation for providing gap spacing of 3mm or less is that it prevents plasma from entering the gap between the shield and target/cathode.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '377 by using a gap width of less than 3mm since it would have prevented plasma from entering the gap between the shield and target/cathode and prevented sputtering of material other than the target.

18. Claims 19, 20, 22 and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '377 in view of the admitted prior art of record or Nakamura as applied to claims 14 and 18 above, and further in view of JP '873.

The teachings of claims 14 and 18 have been discussed above and are incorporated herein.

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The gap has a radial component defined by a spacing extending radial between a radial point defined by an outer edge of the cathode and another radial point defined by an inner circumferential surface of the metal plate (as applied to claim 22).

The gap has an axial component defined by a space extending axially between the metal plate and the target having an axially extending length and a radial component defined by a spacing extending radial between a radial point defined by an outer edge of the cathode and another radial point defined by an inner circumferential surface of the metal plate (claims 27 and 28).

The differences between the instant claims and JP '377 are of the depth of the gap being 3mm or greater (claims 19, 20, 22, 25 and 26-28).

JP '837 discloses a HF sputtering system wherein the earth shield around the target is configured such that it prevents plasma from entering the space between the side of the target and the shield ring (abstract).

In such a configuration, the gap between the target and shield is 0.5-5 mm and the depth of the gap is 1-10 mm (abstract). Note that a significant portion of the gap depth range of JP '837 (3-10 mm) is the same gap depth as recited in the instant claim with 10 mm being a specific data point.

Given the obvious modification of Landau in view of either the admitted prior art of the instant application one of ordinary skill in the art would have found it obvious to prevent plasma from entering the gap between the shield member and target/cathode. By restricting the plasma from the region between the target and shield, no sputtering of

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the cathode will occur and only the target material itself will be sputtered. The result is a highly pure target deposited film on the substrate void of sputtered contaminants.

In order to prevent plasma from entering this region, one of ordinary skill in the art would have found it obvious to optimize the depth of the gap defined by the metal plate 26 to be any depth which prevents plasma from entering the gap having a width of 3 mm or less (as taught by Nakamura and the admitted prior art relied upon in the instant application). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

The motivation for providing a gap depth of 3 mm or greater is that it would have provided an arrangement which would have prevented plasma from entering the space between the side of the target and the shield (as applied to claims 19, 20, 22 and 25-28).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '377 by providing a gap depth of 3 mm or greater since it would have provided an arrangement which would have prevented plasma from entering the space between the side of the target and the shield.

Response to Arguments

19. Applicant's arguments with respect to claims 17-20, 22 and 24-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo
Patent Examiner
Art Unit 1745

gc



May 28, 2003